

CLAIMS

WE CLAIM AS OUR INVENTION:

1. A process for producing a ceramic shaped object from ceramic powder, said process comprising forming a first region of the shaped object by laser sintering of a first ceramic powder and further comprising forming a second region of the shaped object integral with said first region by laser sintering of a second ceramic powder, wherein the forming of at least one of the first and second regions comprises controlling at least one parameter selected to provide a different material property in the first and second regions of the shaped object.
2. The process of claim 1 wherein the process is controlled to form a ceramic mold.
3. The process of claim 1 wherein the material property is selected from the group consisting of densification, porosity, surface roughness and any combination thereof.
4. The process of claim 1 further comprising controlling a laser beam generated during said first and second laser sintering processes to produce a different sintering temperature over the first and second regions of the object, thereby creating a different degree of densification in the first and second regions of the shaped object.
5. The process of claim 2 further comprising at least one of an additional laser sintering process and a hot isostatic pressing of the ceramic mold to achieve any further densification.
6. The process of claim 1 further comprising accessing a computerized representation of the object, and using said computerized representation to control the process for producing the ceramic shaped object.
7. The process of claim 2 further comprising controlling the process to form the first region of the ceramic mold to comprise a shell and the second region of the ceramic mold to comprise a core disposed in a cavity of the shell.

8. The process of claim 2 wherein the first region of the ceramic mold comprises an inner region of the mold, and the second region of the ceramic mold comprises an outer region of the mold and further wherein the process is controlled so that said inner region is relatively denser than said outer region of the mold.
9. The process of claim 1 further comprising using at least one of a ceramic powder, and a powder mixture comprising grain sizes of less than 30 μm for at least one of the regions of the object.
10. The process of claim 1 wherein the ceramic powder comprises at least one ingredient that affects densification and/or sintering of the ceramic powder by producing a liquid phase for at least one of the regions of the object.
11. The process of claim 2 wherein the process is controlled to provide a surface in an inner region of the ceramic mold comprising a surface roughness different from an outer region of the ceramic mold.
12. A ceramic mold formed by the process of claim 1 wherein the first ceramic powder comprises a first material and the second ceramic powder comprises a second material different than the first material.
13. A ceramic mold formed by the process of claim 1 wherein the first region comprises a first porosity and the second region comprises a second porosity different than the first porosity.
14. A ceramic mold formed by the process of claim 1 wherein the first region comprises a first density and the second region comprises a second density different than the first density.
15. A ceramic mold formed by the process of claim 1 wherein the first region comprises a first surface roughness and the second region comprises a second surface roughness different than the first surface roughness.

16. A *ceramic mold* formed by the process of claim 1 wherein the first ceramic powder comprises a first average grain size and the second ceramic powder comprises a second average grain size.